Army Engineers in a Joint and Multinational Environment

A Monograph
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Army engineers operate increasingly as members of joint and multinational forces. Doctrine is ambiguous regarding how commanders can best structure a headquarters capable of employing joint and multinational engineer units to achieve unified action. Ongoing transformation initiatives are eliminating many engineer headquarters which might have served this role. The Army's proposed maneuver enhancement brigade (MEB), a multifunctional brigade integrating engineers and other combat support units under one command, has been suggested as a suitable headquarters for controlling joint and multinational engineer units. This monograph traces the evolution of Army involvement in joint and multinational engineering from World War II to the present to determine what key considerations determine the effectiveness of control structures established to achieve unified engineer action. It then examines the structure of the proposed MEB to determine whether it meets these minimum requirements. The analysis concludes that the current proposed MEB headquarters design may be capable of controlling a small joint or multinational engineer force. However, the brigade should be augmented with additional liaison officers (LNOs) to effectively integrate the efforts of these units. Commanders must determine the unique capabilities and limitations of their joint and multinational partners, and adjust control structures to suit. Further, the MEB requires additional engineer staff capability to effectively employ joint or multinational construction units which lack design or construction management expertise.

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Abstract

ARMY ENGINEERS IN A JOINT AND MULTINATIONAL ENVIRONMENT by LTC Mark R. Schoenemann, United States Army, 52 pages.

Army engineers operate increasingly as members of joint and multinational forces. Although doctrine reflects this reality, it is ambiguous regarding how commanders can best structure a headquarters capable of employing joint and multinational engineer units to achieve unified action. Additionally, ongoing transformation initiatives are significantly altering the Army engineer force, eliminating many headquarters which might have served in this role. The Army's proposed maneuver enhancement brigade (MEB), a multifunctional brigade integrating the contributions of engineer and other combat support units under one command, has been suggested as a suitable headquarters for controlling joint and multinational engineer units.

This monograph traces the evolution of Army involvement in joint and multinational engineering from World War II to the present to determine what key considerations determine the effectiveness of control structures established to achieve unified engineer action. It then examines the structure of the proposed MEB to determine whether it meets the minimum requirements to control joint and multinational engineer units.

The analysis concludes that the current proposed MEB headquarters design may be capable of controlling a small joint or multinational engineer force. However, the brigade should be augmented with additional liaison officers (LNOs) to effectively integrate the efforts of these units. Commanders must determine the unique capabilities and limitations of their joint and multinational partners, and adjust control structures to best employ and support them. Further, additional engineer staff capability should be provided to effectively employ those joint or multinational construction units which lack design or construction management expertise.

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Introduction

MG Hardcastle looked intently at his chief planner. "If we're going to be successful in this upcoming deployment, we're going to need a lot more engineers than we have in the division. What are the force planners telling us?"

"Sir, we'll be getting several additional units, including Navy and Air Force engineers, two additional Army battalions, and some assorted detachments. We'll also be supported by four multinational engineer contingents."

"Sounds like a lot of capability. Don't these other units come with their own requirements and restrictions?"

"Yes, Sir, they do. In particular, several of our coalition partners will not allow their units to operate outside of secure bases, and some of the joint service units will have challenges providing their own security."

"This is going to be a significant command and control challenge. How am I supposed to manage these folks? Is an engineer brigade headquarters included in the mix?"

"No, Sir, they're giving us a maneuver enhancement brigade."

"Commanded by an engineer, though, right?"

"Not necessarily, Sir. In fact, it may have a major as the senior engineer."

Hardcastle digested this news. "I have significant doubts about this. Is this new brigade really capable of managing all these joint guys … and the coalition units?"

--XX Division headquarters conversation, unknown future date

Although fictional, the preceeding vignette highlights some of the challenges that Army engineer transformation presents to commanders. We will return to MG Hardcastle and his dilemma in the conclusion of the monograph.

In the future, the armed forces of the United States will conduct military operations as a joint force. Whenever possible, they will also act in concert with other nations' forces.[1] As key

[1] Chairman of the Joint Chiefs of Staff, Joint Publication 1, *Doctrine for the Armed Forces of the United States* (Washington, DC: U.S. Government Printing Office, 2007), I-2; VI-1.

enablers of offensive, defensive, and stability operations, Army engineers must be able to operate effectively in this joint and multinational environment. In an era of aggressive scrutiny of resource requirements, Army force designers have placed increased emphasis on reducing the number of specialized units in favor of flexible, modular, and multifunctional units capable of a variety of tasks.[2] Further, the emphasis on joint warfighting has enabled force planners to seek efficiency through reduction of redundant capabilities among the services.[3]

The term "unified action" refers to "the synchronization, coordination, and/or integration of the activities of governmental and nongovernmental entities with military operations to achieve unity of effort."[4] Combatant commanders, joint task force commanders, and subordinate commanders employ unified action to optimize the efforts of the military services, other U.S. government agencies, multinational forces, and intergovernmental and nongovernmental organizations to accomplish operational objectives.[5] The services' engineer forces facilitate freedom of action, assisting commanders in their accomplishment of missions. Their efforts are expressed as one aspect of unified action.[6] Army engineers expect to act in concert with engineer and other forces from the other services and from multinational partners to accomplish combatant commanders' objectives.[7]

The Army has moved aggressively to restructure its engineer corps to reflect these realities, reducing by half the number of unique engineer unit types, and reducing the overall size

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[2] Mike Presnell, "Army Modularity and the Future Engineer Force" (briefing presented to the U.S. Marine Corps Engineer Conference, 22 Feb 2005), slide 26.

[3] Mark Moffatt, "Truly Joint Construction Engineers: The Time is Now", Strategy Research Project Report, (Carlisle Barracks, PA: U.S. Army War College, 2007), 13.

[4] JP 1, *Doctrine for the Armed Forces*, II-2.

[5] Ibid, II-2, 3; Fig II-1.

[6] Chairman of the Joint Chiefs of Staff, Joint Publication 3-34, *Joint Engineer Operations*, (Washington, DC: U.S. Government Printing Office, 2007), I-1.

[7] United States, Department of the Army, Field Manual 3-34, *Engineer Operations* (Washington, DC: U.S. Government Printing Office, 2004), I-25, 26.

of the engineer force.[8] These efforts increase the likelihood that Army engineers will be joined by other joint and multinational engineer forces to accomplish operational engineer missions.[9] What is not clear is how the efforts of these various engineer forces can be integrated to fulfill the engineers' tasks of mobility, countermobility, survivability, sustainment, and geospatial engineering support to military forces in combat and stability operations. Recent operations in Afghanistan and Iraq have included joint service and multinational engineers cooperating with U.S. Army engineers in a variety of *ad hoc* command and control arrangements.[10]

The discussion on this issue is just beginning. COL James Shumway has examined the suitability of the proposed modular maneuver enhancement brigade (MEB) headquarters structure for command and control of engineer and other combat support forces in support of maneuver units.[11] He makes cursory mention of the potential for using the MEB to control joint and multinational engineer and other forces, but does not examine this question in detail.[12] Similarly, the services' doctrinal engineer manuals treat the subject of joint and multinational engineer operations in a broad manner, suggesting general considerations for planning in a wide array of situations. They do not address the merits of particular headquarters structures as command and control organizations for such operations.[13] Given the increased likelihood of joint

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[8] Presnell, "Army Modularity and the Future Engineer Force", 26.

[9] FM 3-34, *Engineer Operations*, I-25.

[10] Moffatt, "Joint Construction Engineers", 4, 10; James D. Shumway. "A Strategic Analysis of the Maneuver Enhancement Brigade" (Strategy Research Project Report Carlisle Barracks, PA: U.S. Army War College, 2005), 8-9.

[11] The name of this organization has changed several times during the force development process. Originally called the Maneuver Enhancement Brigade, it was later termed the Combat Support Brigade (Maneuver Enhancement) or CSB(ME). In late 2007, the name reverted to Maneuver Enhancement Brigade. LTC Marty Wegner, personal communication, 16 January, 2008.

[12] Shumway. "Maneuver Enhancement Brigade", 15.

[13] JP 3-34, *Joint Engineer Operations*, II-3 through 8; FM 3-34, *Engineer Operations*, 1-22 through 25, E-7, F-6, G-6, H-1 through 4; United States, Department of the Navy, Navy Tactical Reference Publication 4-04.2.1, *Doctrinal Reference for the Naval Construction Force (draft)* (Washington, DC: U.S. Government Printing Office, 2007), A-5; United States, Department of the Navy, United States Marine Corps, Marine Corps Warfighting Publication 3-17, *Engineering Operations* (Washington, DC: U.S.

and multinational engineer operations in the contemporary operating environment (COE), this monograph addresses the requirements necessary for Army engineer units to act in concert with engineers from other services and nations.

The first section surveys the American participation in joint and multinational engineer operations in World War II. That conflict offers numerous examples of operations which set a standard of success against which to measure subsequent operations. Successful engineer integration in World War II typically resulted from unified command or a clearly established support relationship, a robust headquarters staff capable of supporting diverse subordinate units, and unit capabilities well matched to missions. These criteria will serve as measures of success for subsequent engineer operations and the suitability of engineer command and control organizations.

The second section discusses recent changes in joint and multinational warfare, and how those changes are reflected in current doctrine, especially as it relates to engineer operations. It illustrates these developments with examples from late-twentieth century operations, including experiences in the Persian Gulf and the Balkans. These operations provide further illustration and validation of the success criteria demonstrated in World War II engineer operations: command and control, robust staff structure, and capabilities matched to missions.

The third section addresses the question of the capabilities of the services' current engineer forces, and the degree to which they are complementary, relying on service and joint engineer doctrinal publications. It also discusses the engineer capabilities of selected coalition partner nations, as reflected in their participation in current operations in Iraq and Afghanistan. This section examines the lessons learned from recent and current joint and multinational

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Government Printing Office, 2000), 1-14; 7-1; United States, Department of the Air Force, Air Force Doctrine Document 2-4.4, *Bases, Infrastructure, and Facilities* (Washington, DC: U.S. Government Printing Office, 1999), 25, 31.

engineer operations, and the requirements those operations place on the command and control structures established for such operations.

The fourth section addresses the question of what the proposed MEB will look like. It traces the development of the MEB organizational concept since 2002, as reflected in concept papers and briefings on modularity. Key questions addressed include whether the most recent organizational concept for the brigade will meet the minimum requirements to control and support joint and multinational engineer forces, and what modifications or additional capabilities the unit should have in order to fulfill the requirements of a joint and multinational engineer headquarters. The Conclusion summarizes the findings of the monograph, makes recommendations regarding possible modifications to the MEB structure, and outlines areas in need of further research.

Joint and Multinational Engineers: The World War II Experience

In examining the potential for Army engineer units to operate in the contemporary joint and multinational environment, it is instructive to review the experience of World War II. That conflict's unprecedented scope, involving numerous operations with allied forces, provided significant opportunities to employ Army engineers in joint and multinational operations.[14] A search of the literature reveals three categories of U.S. Army experience with joint and multinational engineer operations: joint and multinational construction in the Pacific theater, the formation of joint engineer amphibious units and their employment in the European and Pacific theaters, and the formation and employment of integrated beach demolition units for the clearance of antilanding obstacles from invasion beaches.

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[14] Three volumes in the "U.S. Army in World War II" series are particularly important to this study: Blanche D. Coll, Jean E. Keith, and Herbert H. Rosenthal, *The Corps of Engineers: Troops and Equipment* (Washington, DC: U.S. Army Center of Military History, 1958); Alfred M. Beck et al., *The Corps of Engineers: The War Against Germany* (Washington, DC: U.S. Army Center of Military History, 1985); Karl C. Dod, *The Corps of Engineers: The War against Japan* (Washington, DC: U.S. Army Center of Military History, 1966).

Engineer Construction in the Pacific Theater

Engineers were busy in every theater during the war, but the Pacific theater placed unique demands on the engineer force.[15] The paucity of existing infrastructure meant that extensive engineer work was required to accommodate and support forces. In this theater especially, there were never enough engineers to accomplish all the work required. Shipping shortfalls exacerbated the engineer shortage, as commanders frequently opted to allocate scarce shipping to combat forces and equipment, at the expense of engineers and other service and support units and their equipment.[16] Commanders reacted to the shortage of engineer units and the backlog of construction tasks in a variety of ways, including restructuring combat formations. For example, the Marines redesigned their divisions in 1944, removing their organic naval mobile construction battalions (NMCBs). Commanders could not afford to let the NMCBs sit idle during the refit and training periods between amphibious assaults.[17] The NMCBs stayed fully employed in construction tasks, joining active Marine forces for specific operations.

As a consequence of the overall shortage of engineers, commanders seldom had the luxury of being able to restrict specialized engineer units to a narrow range of tasks for which they were designed or particularly suited. In the Southwest Pacific Area, in particular, the normal approach was *force-pooling*, treating various general construction, service, and engineer aviation units as interchangeable. Although they were members of the Engineer Corps, the engineer aviation battalions were under the control of the Army Air Forces. Designed for the construction of airfields, their equipment and technical specialties were not greatly different from those of the

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[15] Dod, *The War against Japan*, 210-11, 267-8.

[16] Ronald H. Spector, *Eagle Against the Sun* (New York: Vintage Books, 1985), 299-300.

[17] Jeter A. Isely and Philip A Crowl, *The U.S. Marines and Amphibious War* (Princeton, NJ: Princeton University Press, 1951), 60, 452.

general construction units in the Army Ground Forces. Both types of unit had more heavy equipment than the engineer service units of the Army Service Forces.[18]

Although GHQ US Army Air Forces expressed strong objections to force pooling, local Air Force commanders were more accepting of the practice, recognizing that unifying the efforts of available engineers and avoiding duplicative command and logistical support arrangements was the most efficient means of coping with the shortage of engineer forces. Despite significant morale problems and sometimes cumbersome command channels, the official Air Force history of the war concludes that the accomplishments of the pooled engineers justified the practice.[19] Although the force-pooling approach met with resistance, the policy remained a common one throughout the war.

The equivalent treatment of Army engineer units inherent in the force-pooling concept also extended in a number of operations to naval construction units in theater. The experience was decidedly mixed. Interservice rivalries were common, and Army and Navy units frequently failed to cooperate. There were, however, notable examples of successful collaboration, including multinational engineer arrangements

Early in the Guadalcanal operation, Army and Navy engineer units together worked to establish and maintain facilities on nearby Espiritu Santo. The 7th Naval Construction Battalion was joined by one company of the 810th Engineer Aviation Battalion to construct two airfields. Additional Army engineers arrived to build roads and camp facilities.[20] On Guadalcanal proper, Army engineers joined the Marines' fight in November 1942. The 57th Engineer Combat Battalion, supporting the Americal Division, worked with Marine engineers and directly for

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[18] This discussion is drawn from Coll, Keith, and Rosenthal, *Troops and Equipment*, 234-5; Dod, *The War Against Japan*, 210, 547, 681, 685-7.

[19] Wesley F. Craven and James L. Cate, *The Army Air Forces in World War II, Vol. VII: Services Around the World* (Chicago, IL: University of Chicago Press, 1958), 277-279, 287-293.

[20] Dod, *The War against Japan*, 206-7.

Marine combat units in numerous combat support roles, including extensive road and bridge construction, fortification, and airstrip construction.[21]

The prolonged struggle for Guadalcanal drove operations in the South Pacific Area for many months. In February 1943, the 43d Infantry Division secured the nearby Russell Islands, in order to interdict Japanese efforts to reinforce their troops on Guadalcanal. Army combat engineers constructed roads and water points, while naval construction battalions built airfields. Concurrently, naval construction units built large depot facilities on New Caledonia, with assistance from Army engineers.[22]

By mid-1943, the rear areas of the South Pacific Area had matured considerably. The newly-activated 13th Air Force assumed control of the engineer aviation battalions there, originally assigned to the Services of Supply. Throughout the area, commanders clarified engineer responsibilities and supervisory arrangements. Where joint engineer cooperation had previously been informal and haphazard, commanders established clear lines of authority. On outlying islands far from the more important airfields, local base engineers, whether Army or Navy, supervised all resident engineer units, including the aviation engineers. On the islands with a substantial Air Force presence, the 13th Air Force assumed responsibility for the engineer aviation units. In the immediate combat zone, the Navy planned and executed airfield construction, with Army engineer aviation units in support.[23] The clear lesson in this part of the theater was that effective joint engineer operations required unambiguous command authority.

The same lessons emerged in the Central Pacific Area. In late 1943, U.S. forces landed in the Gilbert Islands and began construction of airfields and base facilities to support further westward operations. A variety of units shared the overall engineer effort: naval construction

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[21] Ibid, 207-8.

[22] Ibid, 233-4.

[23] Ibid, 243.

battalions, Marine engineers, engineer aviation battalions, and Army construction and general service units. On each island, one staff engineer supported the base commander, either Army or Navy, supervising all engineer units regardless of type or service.[24] By centralizing all engineer effort under the direction of a single engineer, each base commander achieved unity of effort.

Operations soon moved to the Marshall Islands. On Eniwetok, engineer supervisory relationships were initially vague. The naval construction battalion brought to the island to construct a naval base was hard pressed to accomplish all of the required work, while elements of two Army engineer battalions executed supply dump organization and burial details. The Army engineers pointed out that their capabilities were largely wasted, whereupon the atoll's naval commander asked them to assist in base construction. The Army units engaged in a major effort to erect buildings, clear land for runways and facilities, and construct aircraft revetments. The naval force commander had been unaware of the Army units' capabilities.[25] In this case, the lack of formally centralized control initially prevented the engineer force from achieving unity of effort.

Joint engineer cooperation was lacking initially in the Admiralty Islands in early 1944. The 6th Army gave four naval construction battalions the responsibility for constructing the airfields in the island group, but did not give the Army task force engineer clear authority over the naval units. He could only issue orders to the units through their higher headquarters, the 17th Naval Construction Regiment. Administration and direction of Army engineer units were also confused, with units unaware of who they were working for. After several weeks of frustrating disagreements, the task force engineer assumed direct operational control of all construction units, greatly reducing frictions and delays.[26] The initial failure to establish clear lines of

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[24] Ibid, 381.

[25] Ibid, 485.

[26] Ibid, 525-6, 543.

authority and supervision under the mission commander had significantly impeded engineer effort. This was resolved when the task force engineer assumed centralized operational control of both services' engineer units.

U.S. forces on the island of Saipan experienced no such difficulties. Late in 1944, engineer construction operations on the island were the responsibility of the 1176th Construction Group. Redesignated Headquarters, 1st Provisional Engineer Brigade, the augmented unit commanded 11 Army engineer battalions (eight aviation or construction battalions and three combat battalions), three naval construction battalions, and several supporting companies.[27] The naval battalions assigned to the brigade worked on projects of interest to the Navy, but the brigade commander, COL Brendan Burns, had full command of all engineer units on Saipan. The unambiguous command relationship resulted in effective joint engineer operations on the island. This centralized approach to engineer command and control would be seen again in the Philippines, with the establishment in March 1945 of an (Army) engineer construction command.[28] In repeated instances, centralized command and control maximized the contributions of scarce engineer construction assets from all services.

The Pacific theater also saw numerous instances of multinational engineer operations, principally with Australian engineer units. At Aitape on New Guinea, two Army engineer aviation battalions joined three "mobile works squadrons" (construction battalions) from the Royal Australian Air Force (RAAF) for the rehabilitation and construction of several airfields during early 1944. Working under the direction of the Australian task force engineer, the units cooperated effectively.[29] Several months later, Australian and U.S. engineers collaborated again during construction operations on the island of Noemfoor, just off New Guinea's northern coast.

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[27] Ibid, 511-12.

[28] Craven and Cate, *The Army Air Forces in World War II*, 292.

[29] Dod, *The War against Japan*, 533.

Again, two Army engineer aviation battalions and three RAAF construction squadrons joined forces under the direction of an Australian task force engineer, rebuilding four Japanese airstrips and constructing supporting facilities.[30] American and Australian engineers together worked on airfields on Morotai, halfway between New Guinea and the Philippine Islands, and in December 1944, Australian and American engineers refurbished and constructed several airfields on the Philippine island of Mindoro, in order to extend air cover for the upcoming landings on Luzon .[31]

Throughout the construction effort in the Pacific theater, many joint and multinational engineer units successfully executed missions, sometimes by mutual consent, sometimes by design. The experiences demonstrated that success was far more likely when a single authority directed all engineers in a clear and unambiguous command or support relationship. When larger unified engineer forces executed successful construction operations, the size of the controlling headquarters (group, brigade, or engineer command) directly reflected the size of the force and complexity of the mission. The headquarters staff was capable of coordinating and supporting the force. Finally, although specialized airfield and other construction units may have been preferred for certain missions, the services' construction units did not differ greatly in capability, and all were generally able to operate in tactical environments under austere conditions. This simplified the process of force-pooling of units, and helped planners match capabilities to missions. Satisfaction of these criteria resulted in mission success.

The Engineer Amphibian and Special Brigades

One little known aspect of joint engineer operations in World War II involves the creation of the engineer amphibian brigades, later known as engineer special brigades.[32] They

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[30] Ibid, 561-3.

[31] Ibid, 566-68, 586.

[32] A highly readable history is provided by William F. Heavey, *Down Ramp!* (Nashville, TN: Battery Press, 1988). Additional background is given by Coll, Keith, and Rosenthal, *Troops and*

were first created in order to deliver combat forces and supplies to the coast of France during the projected amphibious assault across the English Channel. The concept involved loading medium and small landing craft on the friendly shores of England and sailing them straight to the landing beaches ("shore to shore"), rather than transloading the smaller vessels from larger ships in close proximity to the beaches ("ship to shore"). Operational planners felt that the latter approach was unnecessarily risky, exposing naval vessels to enemy attack during the awkward transloading period.[33]

The shore to shore approach would require very large numbers of landing craft, since the assault waves would all embark at once. As the services considered the implications of amphibious assault, the Navy soon realized that they would not be able to supply enough trained personnel to man the large numbers of landing craft required. The Joint Chiefs gave the problem to the Army, who in turn gave it to the engineers.[34] The engineers adopted a joint approach.

The engineers drew on the experience of the U.S. Marine Corps, developers of American amphibious warfare doctrine. They designed amphibious brigades which included combat engineers, boat battalions, and beach party units. The emphasis on shore parties was particularly important. The Marines had repeatedly noted during their interwar exercises and early World War II operations the importance of a robust and well-trained beach establishment to unload rapidly boats and transports and organize beachhead logistics.[35] The Marines' own shore party

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Equipment, Dod, *The War against Japan,* and Sid Berger, *Breaching Fortress Europe* (Dubuque, IA: Kendall/Hunt, 1994).

[33] Dod, *The War against Japan*, 227.

[34] Coll, Keith, and Rosenthal, *Troops and Equipment*, 360.

[35] Isely and Crowl, *Amphibious War*, 64, 66, 452. Marine divisions were reorganized in 1942 to include an engineer regiment, which controlled the divisional engineer battalion, a divisional pioneer battalion, and an attached naval construction battalion. The engineers generally executed combat engineer (sapper) support to the infantry regiments. The NCB executed airfield and base construction. The pioneers' principal duties were the organization of the beachhead as the principal shore party unit, but they were frequently supported by the engineer battalion and the NCB. Due to the intense demands for engineer construction in the Pacific, the NCB was removed from the Marine division structure in early 1944. The

system was slow to develop, and shortcomings in their system would plague the landings on Guadalcanal (August 1942) and Bougainville (November 1943). Force planners were loathe to "waste" manpower resources on purely logistical tasks, and maintained that the short-term surge requirement for shore-party augmentation should be filled by combat troops diverted from the line. This practice significantly reduced available combat troop strength during the critical early stage of the landing operation.[36] The Marines' shore party organization finally achieved a measure of efficiency in the New Britain landings of December 1943, but shore party organization and function remained an area of concern as late as the Iwo Jima operation of February 1945.[37]

The Corps of Engineers rapidly drew up plans to establish training centers at Camp Edwards, Massachusetts, Carrabelle, Florida, and Fort Lewis, Washington, and began forming the eight brigades envisioned. Part way through the process, the Navy announced that it intended to man any craft longer than 50 feet, reducing the need for Army crews. Several months later, the Navy stated its position that no more than three Army amphibian brigades would be required, since it regarded the cross-Channel assault as a special case, and that it intended to man all boats for all other amphibious assaults, in whatever theater. The Navy gave further indications that it might well move to take control of the entire amphibious effort, eliminating the Army engineer amphibian program altogether.[38]

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division also lost its engineer regiment headquarters at this time. Henceforth, the engineer and pioneer battalions were controlled directly by the division headquarters.

[36] Ibid, 127-8, 179.

[37] Ibid, 185, 520-21; Dod, *The War against Japan* , 274. The Marines were under Army control for the New Britain operation. Although boat units of the Army's 2d Engineer Special Brigade lifted the Marines to the beachhead, the success of the shore party operation on New Britain is due entirely to the Marines' own efforts, as Army shore party units did not participate. Heavey, *Down Ramp!*, 107.

[38] This discussion is drawn from Coll, Keith, and Rosenthal, *Troops and Equipment*, 369, 376; Berger, *Breaching Fortress Europe*, 14-20.

Against this backdrop of interservice bickering and uncertainty, the Engineer Amphibian Command continued to develop the organization of the amphibian brigades and to train boat crews and shore parties. Each brigade included a boat regiment, a shore regiment, a boat maintenance company, and supporting units which included medical, ordnance, quartermaster, and signal units. During operations, they would be augmented by naval shore party and signal units.[39] Meanwhile, developments in the Pacific theater would have a profound impact on the future of these units. The pace of operations there accelerated in late 1942 and early 1943. Assault landings became much more frequent than the Joint Chiefs had foreseen. In General Douglas MacArthur's Southwest Pacific Area, the demand for seaborne assaults to outflank Japanese defenses on New Guinea outstripped the Navy's willingness to support them. The Navy was reluctant to commit its scarce fleet resources to congested waters in range of enemy airpower in order to launch ship to shore amphibious assaults.[40] The situation was tailor made for the shore to shore assaults that the engineer amphibian brigades were training for, and MacArthur requested the transfer of several brigades to the Southwest Pacific. The Navy objected initially to the transfer, regarding such landings as naval operations. By March 1943, the War and Navy Departments agreed to transfer the brigades to MacArthur's control.[41] Because the brigades' shore to shore flanking operations would be conducted virtually independently of the Navy, MacArthur requested that the units be renamed engineer *special* brigades.[42] The renaming reinforced the Army's contention that the units' training should remain an Army responsibility.

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[39] Heavey, *Down Ramp!*, 17.

[40] D. Clayton James, *The Years of MacArthur, Vol. II: 1941-1945* (Boston: Houghton Mifflin, 1975), 283-284; Stephen R. Taaffe, *MacArthur's Jungle War* (Lawrence, KS: Univ. Press of Kansas, 1998), 15-16. In addition to their tactical reasons for wanting to avoid the area's abundant Japanese air bases and air power, the Navy's reluctance to support MacArthur also stemmed from personal animosities and a conviction that their own offensive drive across the Central Pacific was the shortest path to victory.

[41] Coll, Keith, and Rosenthal, *Troops and Equipment*, 386; Berger, *Breaching Fortress Europe*, 18-20.

[42] Ibid.

In the Southwest Pacific Area, three engineer special brigades conducted numerous short-range landing operations, assisting MacArthur's progress through New Guinea and on into the Philippines. In many of these operations, the engineer boatmen worked directly for Australian Army units.[43] At the conclusion of the landings on Luzon, the Navy's Seventh Fleet Amphibious Force lauded the special brigades' performance, calling them "the most efficient Shore Party organization now functioning in amphibious warfare."[44] The Army-led joint engineer organization had proven its worth.

The purpose-designed headquarters and staff structures of these brigades provided unified command and effective support of the amphibious forces and their landing operations, earning high marks from the Navy for efficiency and organization. Success also resulted from capabilities commensurate with missions. The brigades' organic capabilities matched the requirements of shore to shore amphibious assaults, as developed during testing and training by the Engineer Amphibian Command. at Camp Edwards, MA.

In the European theater, the Navy had reasserted its control over all landing operations, and the remaining engineer special brigade units lost their boat-operation tasks. Instead, the brigades functioned as robust beach organization units during the landings in North Africa, Sicily, Italy, and France. Each brigade included a Navy beach party unit. The brigades marked beach hazards, beach limits, and debarkation sites, controlled boat traffic near the beaches, directed unloading operations and vehicular traffic, and controlled the establishment of supply dumps on the beaches.[45] The 1st Engineer Special Brigade, the first brigade organized and trained by the Engineer Amphibian Command, supported landing operations throughout the ETO. During the Normandy invasion, this brigade supported the 4th Infantry Division assault landing on UTAH

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[43] Heavey, *Down Ramp!*, 63-69.

[44] Quoted in Coll, Keith, and Rosenthal, *Troops and Equipment*, 390.

[45] Discussion drawn from Beck et al., *The War Against Germany*, 316.

Beach, and was joined by naval boat, shore party, and construction elements. The brigade had lost its original organic boat units when the Navy insisted on retaining control of ETO amphibious operations. The 5th and 6th Engineer Special Brigades were *ad hoc* organizations created from existing engineer combat group headquarters to support the assault landings on OMAHA Beach. These two brigades operated under the overall supervision of the Provisional Engineer Brigade Group. Each brigade controlled three engineer combat battalions which initially conducted combat demolition (obstacle removal) tasks, but which rapidly transitioned to shore party tasks. These two brigades received support from naval beach battalions and naval construction battalions, but the naval components were never integral to these Army brigades.[46]

Despite their *ad hoc* organization, the 5th and 6th Brigades executed their D-Day tasks fairly successfully. Their difficulties at OMAHA Beach resulted from intense enemy fire and marginal weather, factors which affected the entire landing force. The special brigades' eventual success resulted from a proven overall organizational design, built upon robust engineer group headquarters units. Along with the 1st Brigade, which served throughout the ETO, these brigades' successes also resulted from clear command and support relationships over their Army and Navy elements.

In the European and Pacific theaters, the engineer special brigades had demonstrated two different approaches to a unified organizational structure providing oversight of landing operations and beach organization. In the European Theater, the Navy played the lead role in delivering the Army to the beaches, retaining responsibility for operations on the sea and to the high tide mark. Once ashore, the invasion forces came under the supervision of the engineer special brigades as they unloaded landing craft, directed beach traffic, established supply dumps, and evacuated casualties and prisoners of war. They were efficient in organizing the beach operations, but the division of responsibility at the high tide mark remained. That friction point

[46] Discussion drawn from Berger, *Breaching Fortress Europe*, 70, 74.

was apparent in operations as early as the Operation TORCH invasion of North Africa in November, 1942, where observers noted that although the 1st Engineer Amphibian Brigade's beach organization operations were successful, the transition from Navy to Army responsibility frequently resulted in a loss of momentum in establishing forces ashore.[47] The brigades' robust staffs, clear command and support relationships, and capabilities matched to requirements ensured their success in their assigned beach tasks. Lack of unity of responsibility spanning the high-tide mark hindered the unified action of the overall joint force.

In the Southwest Pacific Area, the engineer special brigades allowed the Army to retain undivided control of the shore to shore movement of the landing force in numerous operations. This avoided the traditional division of responsibility at the high tide mark, reducing friction at a critical point in the assault.[48] The risks of that division of responsibility had been consistently emphasized by the Marines as a key lesson from their inter-war landing exercises. The engineer special brigades' experiences had again demonstrated the value of unified command in achieving unified action in joint operations. Whether capabilities were organic to the special brigades or provided to the brigades by supporting naval battalions, clearly delineated command and support relationships ensured unified action of these engineer-led joint forces.

The Beach Obstacle Demolition Experience

The Special Engineer Task Force was created in 1944 to conduct explosive demolition of beach obstacles during the assault phase of the Normandy landings. This unique organization carried the principle of jointness down to the team level. This approach resulted from an ongoing discussion over which service should be responsible for removing beach obstacles. The eventual

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[47] Allied Force Headquarters, *Lessons of Operation Torch*, January 19, 1943 (Fort Leavenworth, KS: Combined Arms Research Library Digital Library, 2003), 6, 29, 30, http://cgsc.leavenworth.army.mil/carl/contentdm/home.htm (accessed March 24, 2008).

agreement was that the Navy would take responsibility for seaward obstacles, while the Army handled the obstacles "inshore of the point where a landing craft grounds."[49] Planners timed the landings near low tide to ensure that most of the obstacles would be exposed, and the Army took overall responsibility for the joint effort.[50]

The Navy had developed its Underwater Demolition Teams (UDTs) to conduct swimming reconnaissance of beaches and approaches, and execute pre-invasion demolition of coral reefs and man-made obstacles which could hinder assault landings in the Pacific Ocean.[51] In contrast, the demolition teams of the Special Engineer Task Force would land on the Normandy invasion beaches immediately behind the very first infantry assault wave. These teams, termed gap assault teams (GATs), were composite Army-Navy teams which amounted to reinforced platoons. Each team consisted of one Army combat engineer platoon (26 men) and a naval combat demolition unit, itself a joint team of five naval demolitions specialists, five Army engineer demolitions men, and three non-specialist Navy personnel. The addition of one medic brought the total strength of the GAT to 40 men, commanded by the Army platoon leader. Planners allocated one M4 tank dozer (a Sherman equipped with a bulldozer blade) to support each GAT.[52]

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[48] Coll, Keith, and Rosenthal, *Troops and Equipment*, 378; Berger, *Breaching Fortress Europe,* 13.

[49] Quoted in James D. O'Dell, *The Water is Never Cold* (Washington, DC: Brassey's), 68.

[50] Berger, *Breaching Fortress Europe,* 152-153.

[51] O'Dell, *The Water is Never Cold*, 132-133.

[52] The invasion timetable for the Normandy operation called for the demolition teams of the Special Engineer Task Force to land three minutes behind the first assault waves. Berger, *Breaching Fortress Europe,* 83, 151-152, 207. Berger indicates that Navy UDTs also participated at Normandy. This appears to be an error; O'Dell's history of the UDTs, *The Water is Never Cold*, relates only the involvement of the naval component of the Special Engineer Task Force, termed Naval Combat Demolition Units. While the naval personnel worked on demolition of seaward obstacles, their techniques at Normandy were not underwater demolition in the sense of that performed in the Pacific; no snorkeling was involved. In fact, the intent at Normandy was for all demolition personnel, Army and Navy, to land dry-shod. O'Dell, 70, 72-3, 78-81.

Invasion planning allocated eight GATs to the sectors of each of the three initial assault infantry regiments, one each from the 1st, 4th, and 29th Infantry Divisions. Each GAT's mission was to clear and mark a lane 50 yards wide through the beach obstacles, affording following-wave landing craft clear passage as the tide came in. The Special Engineer Task Force retained control of the teams.[53] On UTAH Beach, the GATs rapidly accomplished their demolition tasks, and the 4th Infantry Division landed over a cleared beach. These GATs suffered casualties of about 10 percent. On OMAHA, the GATs were severely hampered by the same galling fire which pinned down the assault infantry units, and suffered 41 percent casualties. In addition, many teams found it impossible to execute demolitions, due to the large number of friendly infantry sheltering behind the obstacles. Only half the teams managed to clear lanes before the obstacles were covered by the tide; additional lanes were cleared at the next low tide. Regardless of the difficulties, Army and Navy observers agreed that the GATs' interservice cooperation was virtually flawless. Some team leaders made on-the-spot decisions to attack seaward and exposed obstacles separately, while others chose to combine their soldiers and sailors in coordinated sequential attacks on the most critical obstacles. In all teams, each element assisted its partner as required to accomplish the mission.[54] The accomplishments of the joint gap assault teams of the Special Engineer Task Force demonstrated once again the value of unified control and capabilities matched to mission in achieving unified action.

Experience throughout the war provided abundant evidence of the value of clear lines of command and direction to achieve unified engineer action. It would be many years before that same sense of joint and multinational engineer unified effort would again be felt.

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[53] Berger, *Breaching Fortress Europe*, 152; O'Dell, *The Water is Never Cold*, 78-79.

[54] This discussion is drawn from Berger, *Breaching Fortress Europe*, 153-158, 166-167, 207-209, 219; O'Dell, *The Water is Never Cold*, 79-81.

Joint and Multinational Engineers since World War II

World War II had seen numerous examples of Army engineers working in a joint and multinational context. After the war, service parochialism returned, and Army engineers did not engage in significant joint and multinational engineer operations until late in the twentieth century. Despite the enactment of the 1947 National Security Act, joint action remained elusive, and U.S. forces fought the Korean War largely along service lines. In Vietnam, too, each of the services controlled their engineer forces along strict service lines. In general, Army engineer forces supported Army field forces. Although selected Army engineer units executed port and airfield construction, they were under the command and control of Army engineer headquarters units.[55] It was only after the Goldwater-Nichols Department of Defense Reorganization Act of 1986 that jointness again became a significant aspect of engineer operations.

Stability Operations

The renewed emphasis on jointness could be seen during stability operations in the 1990s. In 1995, U.S. forces deployed to Haiti leading a multinational effort to provide a stable and secure environment for free elections. The bulk of the Army's 92d Engineer Battalion deployed as part of this force, augmented in country by Canadian military engineers to form an integrated multinational engineer battalion, the Can-Am Engineer Battalion. The Canadians provided the vertical construction assets, while the American unit provided the horizontal construction capability and overall command. The Canadian contingent was under the operational command (OPCOM) of the U.S. battalion commander.[56] This engineer force remained when the United Nations assumed control of the operation, creating the United Nations Mission in Haiti (UNMIH). Although the Can-Am battalion remained under UNMIH control,

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[55] Robert R. Ploger, *U.S. Army Engineers, 1965-1970*, U.S. Army Vietnam Studies series (Washington, DC: U.S. Army Center of Military History, 1974), 105-108, 110-115.

other U.S. forces in Haiti formed the U.S. Support Group Haiti. This force reflected the U.S. government's determination to maintain a U.S. military presence in Haiti after the end of the UNMIH mission.[57] This parallel U.S. force in Haiti included other military engineers, including Air Force REDHORSE and Navy Seabee units. A joint engineer staff, led by an Air Force engineer and including Navy and Army personnel, controlled these engineer units.[58] Their initial missions were the construction of base camps and infrastructure to support the stability forces. Over time, donor nations contributed funds and materials, enabling the military engineers to execute infrastructure reconstruction and renovation projects improving the quality of life for the Haitian populace. The integrated Can-Am battalion and its unified command arrangement won high praise for its effectiveness, as did the parallel joint engineer force under U.S. Support Group Haiti control.[59] Unified engineer command and control had demonstrated their worth in this stability operation.

The year 1995 also saw the beginning of stability operations in the Balkans. These multinational missions, executed under the leadership of the North Atlantic Treaty Organization (NATO), involved significant engineer effort. In each operation, military engineers played a key role in supporting the peace-enforcement efforts of military forces, constructing base camp facilities and logistic support areas, conducting mine clearance in areas critical to NATO forces, and executing construction or reconstruction tasks in support of military forces, which sometimes incidentally benefitted local civilians.[60] These missions involved significant joint and multinational effort. In the initial entry into Bosnia in 1995, the 1st Armored Division's engineer

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[56] Robert L. McClure, "The United Nations Mission in Haiti," *Engineer* 25 (August 1995): 25-29.

[57] Phillip R. Anderson, "Engineer Roles in Stabilizing Haiti," *Engineer* 26 (March 1996): 26.

[58] Ibid, 24.

[59] Ibid, 27.

[60] Garland H. Williams, *Engineering Peace* (Washington, DC: United States Institute of Peace, 2005), 12-14, 84-91, 142-145. NATO policy restricted construction effort to that which would meet "minimum military requirements"; U.S. policy was similarly restrictive.

brigade deployed at triple its normal strength, due to the attachment of numerous engineer units. In addition to Army combat, construction, bridging, earthmoving, power generation, and fire fighting units, the attachments included two Air Force engineer squadrons and two Navy construction battalions.[61] These forces conducted numerous bridging and bridge replacement missions, cleared and maintained routes, reduced obstacles, cleared mines, and removed snow. They executed the initial construction required to house and support U.S. forces, setting the conditions for the arrival and mobilization of contract construction and sustainment capabilities.[62] During subsequent rotations Army engineers, in collaboration with joint service and multinational engineer units, combined efforts with contracted construction firms to execute major base closures, upgrades and moves.[63] The U.S. engineers' ability to accomplish so much in short order owed much to their unified command and control structure.

Such unity of engineer effort was not evident in the overall coordination of the NATO mission. During operations in Bosnia, two headquarters provided engineer oversight. The Implementation Force (IFOR) engineer, French Brigadier Claude de Wilde, had overall responsibility for developing the theater engineer plan, but had minimal staff and an inadequate appreciation of NATO procedures. His staff spent the initial four months developing policies and an understanding of how NATO forces function. Due to its small size, this staff was not capable of providing construction management oversight.[64] IFOR's subordinate headquarters was the Allied Rapid Reaction Corps (ARRC). In contrast to the IFOR engineer cell, the ARRC engineer staff was a robust organization with numerous professional engineers, capable of producing

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[61] David L. Treleaven, "Engineers in Bosnia: An Overview," *Engineer* 26 (March 1996): 18-29.

[62] Williams, *Engineering Peace*, 93.

[63] Thomas P. Bostick, "Bosnia: The Second Time Around," *Engineer* 29 (April 1999): 2-5; William D. Brinkley, "Proposed Force XXI Engineer Designs: Viable Combat Multipliers?" (Monograph, School of Advanced Military Studies, U.S. Army Command and General Staff College, Fort Leavenworth, KS, 1997), 18.

[64] Williams, *Engineering Peace*, 86-87.

engineering designs and managing a diverse construction program. Its expertise covered all facets of the combat support, construction, and reconstruction missions in Bosnia, supporting the operations of military engineer units and private contractors. The ARRC engineer cell exercised effective coordination of the multinational engineer effort in Bosnia, and in fact wrote the engineer campaign plan which the IFOR engineers ought to have developed.[65] The subordinate ARRC's robust engineer cell enabled effective coordination of the overall engineer effort, compensating for the weakness of the IFOR engineer staff.

Engineer planning for the 1999 Kosovo intervention incorporated many lesson learned during the Bosnian stability operation. Although the overall NATO engineer effort again lacked unified command, the force did achieve a greater degree of unified effort than that displayed in Bosnia. Because the existing infrastructure was less well developed than in Bosnia, and because the local Kosovar contractor base was far less capable than that in Bosnia, the military engineers assumed a greater burden of the overall effort than in Bosnia. Contrary to the experience in Bosnia, military engineers would execute significant reconstruction of key civilian infrastructure, funded by NATO.[66] As in Bosnia, a divisional engineer brigade headed up the U.S. military engineer effort in the Kosovo Force (KFOR). The brigade commanded one organic engineer battalion and several attached engineer forces, including one Army battalion and three companies, explosive ordnance disposal (EOD) units, and one Navy Seabee battalion. The attachments also included some 30 military and civilian engineers from the U.S. Army Corps of Engineers, who provided specialized engineer planning expertise and technical advice.[67] The engineer force faced daunting construction demands in Kosovo, including building two base camps to house 7000 personnel within 90 days. The military engineers' unity of command helped ensure the on-

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[65] Ibid.

[66] Ibid, 143.

[67] Robert L. McClure, "The Engineer Regiment in Kosovo," *Engineer* 30 (April 2000): 6-8.

time completion of the mission requirements. A key lesson of the operation was the importance of an engineer brigade headquarters to integrate the efforts of the joint engineers.[68] The Kosovo operation had again demonstrated, at both the national and the coalition level, the need for robust command and engineer staff coordination capabilities to achieve unified engineer effort.

Joint and multinational engineering had played a major role during this decade of stability operations. In each operation, unified command had significantly enhanced mission success, and robust planning and technical staffs were able to effectively unify the efforts of diverse engineer forces. Small staff elements, such as the IFOR engineer cell in Bosnia, proved incapable of coordinating joint and multinational engineer units. Significant world events would soon put these lessons to the test.

The "Long War"

Combat operations in Afghanistan and Iraq have involved significant employment of engineers in joint and multinational command and control arrangements. Because many U.S. military engineer capabilities reside in the Reserve Components, protracted conflict in these theaters rapidly exhausted the ability of the Army to supply both generalized and special-purpose engineer forces to execute required engineer tasks.[69] In essence, the U.S. military has adopted the World War II approach of pooling engineer forces from all the services, along with engineer units contributed by coalition partners. During recent operations, Army engineer units have served under the command of naval construction regiments supporting Marine forces, Air Force and

[68] Ibid, 10.

[69] Tyrone Bennett, "The Corps Engineer Brigade Construction Mission—a Joint and Combined Arms Effort," *Engineer* 36 (July-September 2006): 21-22.

Navy engineers have provided support to Army forces, and various coalition nations' engineers have supported both.[70]

In Afghanistan, U.S. and coalition forces have engaged in Operation Enduring Freedom (OEF). The OEF operational environment is a significant departure from those of the stability operations of the 1990s.[71] Initial OEF operations were a U.S. affair, with a U.S. command structure, although some coalition nations contributed forces. U.S. forces did not operate under the NATO umbrella, as they did in the preceding decade. Further, they deployed to Afghanistan as combatants, not as peacekeepers. Finally, the Afghan infrastructure was in far worse condition than that in U.S. interventions during the 1990s. Much of the population faced severe privation, requiring a major humanitarian relief. Because of the combat orientation of the operation, "minimum military necessity" was again the order of the day, and military engineering was focused on support of U.S. and coalition forces.[72]

Air Force airfield construction units and Navy Seabees accompanied the first Army engineer units into theater. Engineer units worked initially on repair and upgrade of airfields and base camp construction. Additional specialized units conducted well drilling and power generation and distribution system construction. Coalition engineer contingents arrived to assist in airfield repair, mine clearance, and general engineering.[73] Engineer missions were many and varied, and the engineer force as diverse as any previous stability operation. Recent years have seen an increase in the number of joint and multinational engineer missions in Afghanistan.

The experiences of the 18th Engineer Brigade (Theater Army) exemplify many of the challenges involved in coordinating the joint and multinational engineer support to OEF. The

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[70] Ibid; R. Daren Payne and Carol L. Anderson, "Joint Engineer Culture Clash: Lessons Learned from a Marine Expeditionary Force," *Engineer* 36 (July-September 2006): 11-13; Nancy J. Wetherill, "Coyote Engineers Support CJTF-76," *Engineer* 35 (July-September 2005): 34-37.

[71] This paragraph is drawn from Williams, *Engineering Peace*, 175-177.

[72] Ibid, 188.

brigade is a fairly large headquarters (strength 127) designed to command and control engineer effort at the theater army level. It deployed to Afghanistan in 2005, and returned to Germany in 2006. In addition to Army battalions and companies, the brigade was supported by two Air Force engineer units in a limited tactical control (TACON) role: The Air Force retained ownership of these units, and they could only execute specific projects at Bagram Air Base. The brigade was also augmented by three company-size engineer units from Korea, Slovakia, and Poland. All three multinational contingents were restricted by their governments from operating outside secure Forward Operating Bases (FOBs) (for the Koreans and Slovaks), or more than 10 km from Bagram (the Poles). Two of the contingents were commanded by colonels. These restrictions, the units' logistical shortcomings, language barriers, and sensitivities to national pride led the brigade commander, COL Michael Flanagan, to devote considerable attention to the command and control structure required to employ these units. In brief, the Air Force units worked on Bagram, the multinational units worked on FOBs at Bagram, Jalalabad, and Sharana, and all off-FOB construction, route clearance, and area clearance missions went to U.S. units.[74] The brigade's command and control arrangements will be examined in greater detail later in this monograph.

From the standpoint of joint and multinational engineering, the initial phases of Operation Iraqi Freedom (OIF) were a throwback to the Korean and Vietnam conflicts. Although the various services engineer forces were involved, as were British engineer units, the engineer fight was almost exclusively along service lines.[75] Although Army engineer units did not control

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[73] Ibid, 191, 196-197.

[74] This discussion is drawn from COL Michael Flanagan, telephone interview, January 22, 2008.

[75] Gregory Fontenot, E. J. Degen, and David Tohn, *On Point: The United States Army in Operation Iraqi Freedom* (Fort Leavenworth, KS: Combat Studies Institue Press, 2004), 446-7, 452, 456, 460, 474-5. One exception to this service-pure pattern was the 22nd Naval Construction Regiment (NCR), supporting I Marine Expeditionary Force (I MEF). The 22nd NCR consisted almost exclusively of two Army engineer battalions and three Army bridge companies.

joint or multinational engineers during the operation, they often did exercise control over other supporting units. Often, combat engineer battalions executed security missions or fought as infantry, in addition to conducting engineer missions, especially after initial combat operations ceased. For example, the 54th Engineer Battalion, supporting the 3d Armored Cavalry Regiment, received tasks ranging from road and airfield repair, force protection construction, base support construction, and infantry patrols and guard missions.[76] The battalion's eventual task organization included two of its organic mechanized combat engineer companies, an EOD company, one company from a combat heavy (construction) engineer battalion, and a terrain team.

Similarly, the 1st Engineer Battalion, commanded by then-LTC David Brinkley, supporting the 1st BCT of the 1st Infantry Division, controlled multiple engineer and other units executing a wide range of combat and combat support tasks. Faced with missions ranging from combat patrols, route clearance, and cache site destruction, to vertical and horizontal construction, base operations, and public works, LTC Brinkley's mission set extended far outside the battalion's training. His supporting units included one combat heavy (construction) engineer company (attached), most of a combat support equipment company (attached), and most of a corps combat (wheel) company (DS). Non-engineer supporting units included a chemical decon platoon (assigned), a military intelligence company and the brigade's headquarters company (ADCON), and three Army or Marine infantry companies attached for specific operations. Since the battalion's staff structure was not designed to conduct operations independent from the BCT,

[76] David T. London, "Does the Future Engineer Force Transition Engineer Units Between Offensive and Stability Operations in Ways that Achieve Responsiveness, Versatility, Agility, Effectiveness, and Efficiency?" (Master's thesis, U.S. Army Command and General Staff College, 2005), 59-60.

LTC Brinkley reinforced his staff with elements from other brigade units to more effectively command and control his elements.[77]

The 5th Engineer Battalion, commanded by then-LTC Anthony Funkhouser, also dealt with an expanded mission set and controlled additional supporting units. During its tour, the battalion supported the 4th Infantry Division's 2nd BCT and Division Artillery (DIVARTY), with a separate stint attached to the 555th Engineer Group. Most of the battalion's missions were not strictly engineer missions, and the battalion's attachments were a variety of non-engineer units. The battalion's missions included security of the FOB and its entry control points, route clearance operations, patrols throughout its Area of Operations (AO), training of Iraqi forces, engagement with and civil affairs support for local villages, and construction support for those villages. The battalion's attachments included an infantry company, two chemical companies, a Macedonian Special Forces task force, and a newly-trained Iraqi Army company. The battalion periodically received additional supporting units including air defense, field artillery, and aviation units.[78]

The stability operations during the 1990s had included significant joint and multinational engineer participation. Those experiences had demonstrated the need for robust command and control structures and staff coordination for effective unified engineer action. Combat operations during OEF and OIF have involved far less joint and multinational engineer integration below the engineer brigade level. However, these operations have involved diverse missions and attachments to engineer units which have reinforced the need for robust C2 and staff architecture.

In OEF, the 18th Engineer Brigade exercised TACON over two Air Force engineer units, and absorbed engineer contingents from three coalition nations, in addition to numerous U.S. Army engineer units. In OIF, engineer battalions have adapted to command and control a wide

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[77] This discussion is drawn from COL David Brinkley, e-mail correspondence, February 8, 2008.

[78] This discussion is drawn from COL Anthony Funkhouser, e-mail correspondence, February 17, 2008.

variety of attached and supporting units to accomplish diverse missions. Although few of these supporting units have been joint or multinational *engineer* units, these attachments have strained the engineer battalions' command and control structure, staff architecture, and communications assets. The measures taken by these units' commanders to mitigate these strains are instructive for designing unit structures to effectively control joint and multinational engineer units.

Recent operations have demonstrated the continuing value of unified command and clear supporting relationships in achieving unified engineer effort with joint and multinational forces. This is especially true when different units' capabilities cover a much wider range than was common in the World War II construction examples cited earlier. Robust engineer staffs capable of managing the diverse needs and capabilities of these units remain crucial to success.

Achieving Unified Engineer Action Today

The services anticipate that their engineer units will operate in a joint and multinational environment, as reflected in their doctrinal publications. For example, the Marines' foundational engineer publication states: "Future operations involving MAGTF forces will be joint operations with other Service engineers working concurrently within the area of operation."[79] However, it does not discuss how this integration is to occur, other than the fact that "the engineer staff is responsible for developing requirements and coordinating this support."[80] The Marines generally expect to be the recipients of joint or multinational engineer support, rather than being the supporting engineers.

Air Force doctrine also envisions joint engineer support as being received, rather than provided.[81] The Air Force sees its contribution to joint and multinational operations as being air and space power, not engineering. Its brief doctrinal discussion of joint and multinational

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[79] MCWP 3-17, *Engineering Operations,* 7-1. MAGTF refers to Marine Air-Ground Task Force.

[80] Ibid, 6-1.

[81] This discussion is drawn from AFDD 2-4.4, *Bases, Infrastructure, and Facilities,* 25, 31.

engineering outlines how the supported Air Force command determines its engineering requirements and how those can be met by supporting engineers. It does not address employment of Air Force engineer units as contributions to a joint or multinational force, or as command elements of joint or multinational engineer forces.

In contrast, the Navy's discussion of joint and multinational operations acknowledges that it will frequently provide and receive engineering support.[82] The naval construction force has a close working relationship with the Marines, routinely furnishing units to MAGTF forces to provide a capacity for technical and longer-term construction. The Navy also expects to lead joint and multinational engineer forces when directed. One of the core tasks of a naval construction regiment (NCR) headquarters is to function as a "joint force engineer group functional headquarters when designated and when provided with appropriate augmentation from the supported commander and the other service components."[83] The Navy has recognized the need for a command and control structure for joint and multinational engineer forces, and has designated an organization to serve in this role.

As the service with the largest engineer force, the Army anticipates furnishing engineers to joint and multinational forces on a routine basis.[84] It also anticipates receiving support from joint and multinational engineers. Like the Navy, the Army has designated organizations to command and control joint and multinational engineer forces. At the theater level, the engineer command (ENCOM) can serve in this role. [85] At subordinate levels, the functional engineer brigade "may serve as a joint engineer HQ" with augmentation.[86] The brigade would be assigned

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[82] NTRP 4-04.2.1, *Doctrinal Reference for the Naval Construction Force (draft),* 3-2, 3-4.

[83] Ibid, 3-2. The NCR is roughly equivalent to an Army brigade, and would typically support a corps-sized organization. Ibid, 3-4.

[84] FM 3-34, *Engineer Operations,* 1-25.

[85] JP 3-34, *Joint Engineer Operations,* I-6, B-A-2.

[86] Ibid, B-A-3.

"whenever the number of engineer units or the functional nature of engineer missions exceed the C2 capability of the multi-functional CSB (ME)."[87] While JP 3-34 does not define this C2 capability, concept briefings indicate that the MEB will be able to control five to seven functional battalions of all types (engineer, military police, chemical, or other), and that an engineer brigade may be required when there are three or more engineer battalions.[88]

Both the Army and the Navy have designated engineer headquarters organizations which could command and control joint and multinational engineer forces, if augmented. The nature of the augmentation logically depends on differences in the capabilities of the services' engineer units.

Engineer Capabilities

The World War II Pacific Theater experience had demonstrated the value of force-pooling to accomplish the maximum amount of engineer effort with limited resources. That approach assumed that the various services' engineer units were more or less interchangeable. In the decades after the war, the profusion of highly specialized engineer units made such an assumption less tenable. More recently, the move to reduce the number of unique unit types in favor of fewer general purpose or modular unit types may have made force-pooling more feasible. However, some significant challenges remain.

A prime example is the capability of the services' engineer units to conduct tactical combat or security operations. Army combat engineer battalions and companies are trained and equipped to fight as engineers, and to reorganize to fight as infantry when required, while Army general engineering units conduct tactical convoys, job-site security and unit self-defense. Marine engineer units have similar capabilities. The Navy's principal construction units, the

[87] Ibid. The CSB (ME) is now known as the MEB.

naval mobile construction battalions (NMCBs, or "Seabees"), are capable of conducting self-defense operations and tactical convoys.[89] All three services' engineers can routinely execute missions outside a secured camp or perimeter when required.

In contrast, Air Force construction units are not trained or equipped to conduct ground combat or security operations.[90] In a combat zone, they ordinarily conduct their construction missions inside a base perimeter or other secured area. They have a very limited ability to conduct tactical convoys or secure worksites. As a consequence, it is not surprising that they might have difficulty executing missions outside a secure perimeter without significant external support. That limitation was borne out in operations in 2005 and 2006 in Afghanistan. COL Flanagan's 18th Engineer Brigade had tactical control (TACON) of two Air Force engineer units, but only for missions at Bagram Air Base.[91] MAJ Dan Segura, Operations Officer for the Combined Forces Command—Afghanistan's CJ7 Engineer Directorate, notes that inadequate communications equipment, weapons, and combat training prevented another Air Force engineer unit from executing missions outside the perimeter unless provided with security augmentation (in one instance, by another engineer unit). In contrast, he praises the ability of Seabees to go anywhere.[92] In general, Air Force and Navy engineer units are highly competent technically, but are not designed for ground combat. Army and Marine engineer units tend to trade a degree of

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[88] U.S. Army Maneuver Support Center, "The Army's Maneuver Enhancement Brigade," (Captains Career Course briefing, July 5, 2007), slides 8, 12

[89] This discussion is drawn from JP 3-34, *Joint Engineer Operations,* B-A-1, 4, 5; B-B-1, 2; B-D-2; B-E-2, 3.

[90] Ibid, B-C-1; B-E-2, 3.

[91] Flanagan, telephone interview, January 22, 2008.

[92] MAJ Dan Segura, interview by Operational Leadership Experiences Project team with Combat Studies Institute (CSI), Fort Leavenworth, Kansas, August 10, 2007, digital recording in possession of Combined Arms Research Library, Fort Leavenworth, Kansas.

technical excellence for a more robust tactical or self-defense capability.[93] The services' engineers are not created equal.

The services' engineer units vary considerably in size, design, technical training, and equipment set. This is true even when considering only the subset of construction engineer units, setting aside the combat engineers, which are unique to the Army and the Marines.[94] The services' battalion-level construction units vary in size from the Air Force's 404-member RED HORSE (Rapid Engineer Deployable Heavy Operational Repair Squadron, Engineers) squadron, the Army's 685-member combat heavy engineer battalion, to the 811-member naval mobile construction battalion. Dwarfing these is the Marines' engineer support battalion, a 1475-member organization which combines certain logistics functions (bulk fuel, water, and electric power production and distribution) with construction capabilities similar to those of the other services.[95]

The technical engineering capabilities of these units are not greatly dissimilar. All can execute nearly the full range of general construction tasks, both horizontal (earthmoving and paving) and vertical (buildings and other structures). Beyond this rough commonality of task lists, the services' capabilities are principally dictated by unit size. The Navy's NMCB, roughly twice the size of an Air Force construction squadron, has considerably more equipment and can be expected to execute larger or more numerous construction missions. Certain tasks are outside the capabilities of some units. For example, Air Force units do not execute port construction or lines of communication bridging. Marine units do not execute port construction or paving

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[93] JP 3-34, *Joint Engineer Operations,* B-E-2, 3; MAJ James Schreiner, interview by Operational Leadership Experiences Project team with Combat Studies Institute, Fort Leavenworth, Kansas, November 16, 2006, digital recording in possession of Combined Arms Research Library, Fort Leavenworth, Kansas.

[94] This discussion is drawn from Mark Moffatt, "Truly Joint Construction Engineers: The Time is Now," (Strategy Research Project Report, U.S. Army War College, Carlisle Barracks, PA, 2007), 5-10; Joint Publication 3-34, *Joint Engineer Operations,* Appendix B.

[95] Ibid.

operations, and Navy units do not evaluate airfield pavements or conduct explosive ordnance disposal operations. Other tasks are clearly secondary for particular units: they can execute them, but they do not routinely train on them.[96]

The services' construction units also differ in the level of professional expertise attained by their officers and enlisted personnel. The Air Force and the Navy both demand a higher standard of engineering knowledge from their organizations than do the Army and the Marines. In the Air Force, engineer officers are expected to be trained and licensed as professional engineers.[97] In the Navy's NMCBs, officers are also licensed. In addition, NCOs must achieve and maintain a license in one or more trades in order to be promoted beyond E-6.[98] Although the Army and Marines encourage professional training and licensure, these are not required. As noted previously, the Army and Marines trade a measure of professional engineer expertise for a greater degree of tactical ground combat capability.

Although the services employ much the same types of earthmoving, lifting, and general construction equipment, all procure their equipment separately. As a result, there is little commonality of equipment make or model across the services.[99] The consequences of this mix of equipment are significant. Since 2001, the services have conducted integrated construction equipment operator training at common sites. The full potential of this move towards joint engineer training has been hindered by the need to maintain redundant fleets of construction equipment, to ensure that each service's trainees could train on the makes and models that that service procures. The operational impact is felt when one service's deployed unit is replaced by

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[96] This paragraph is drawn from Joint Publication 3-34, *Joint Engineer Operations*, Appendix B.

[97] Ronald B. Hartzer, "Air Force Civil Engineers: Building Air Power's Foundation," *Engineer* 25 (August 1995): 30-35.

[98] Jack E. Buffington and Michael Bowers, "Navy Seabees and the Civil Engineer Corps: Providing Skills to the Joint Environment," *Engineer* 24 (December 1994): 11-17; Payne and Anderson, "Joint Engineer Culture Clash," 11-13.

[99] This discussion is drawn from Moffatt, "Joint Construction Engineers," 9-11.

another, and functionally equivalent but unique equipment sets must be exchanged due to unique operator training.[100] Service-unique makes and models also significantly complicate the logistical support of units in a joint or multinational command, due to unique repair part requirements. This places an additional burden on the engineer headquarters S4 section sustaining these units.

Achieving unified effort in engineer operations may also be hampered by inadequate or incompatible communications equipment. This is particularly true for multinational engineer units. The 5th Engineer Battalion experienced such communications difficulties with its attached Macedonian Special Forces Task Force.[101] Not only did the Macedonian unit not have compatible equipment, the Macedonians were not cleared for operation of U.S. equipment. The solution was to furnish liaison officers (LNOs) and radios which remained with the Macedonian unit full time. These personnel and radios came "out of hide", at some cost to the battalion's own capabilities.

Although joint service engineer units should have a greater degree of equipment compatibility than a multinational force, some construction units are not generously supplied with radios. For example, Air Force engineer units' communications equipment may be inadequate to support operations by multiple detachments.[102] Thus, even when the equipment is compatible, joint engineer operations may be hampered by communications. Overcoming these communications difficulties will typically require additional personnel and equipment.

COL Mark Moffatt has proposed creating a true joint military engineer force, which would be organized uniformly, train at the same location to the same program of instruction, and

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[100] Ibid, 10.

[101] Funkhouser, e-mail correspondence, February 24, 2008.

[102] Segura, CSI interview.

procure and employ the same models of common engineer equipment.[103] To the degree that this concept becomes reality, the task of integrating and coordinating multiservice engineer units under a joint headquarters will be greatly simplified. Until then, joint engineer cooperation will remain a challenge.

Differences in technical training and capability, self-defense ability, and equipment sets, along with incompatibilities and shortfalls in communications equipment, greatly complicate the task of controlling and supporting a joint or multinational engineer force. Headquarters which coordinate joint and multinational engineer operations must be robust enough to overcome these difficulties. The recent experiences discussed previously indicate that engineer battalions are not well suited for controlling extensive attachments, unless extensively augmented. The more robust staff structure of an engineer brigade is much more suited to controlling and supporting joint and multinational engineer units.

Command and Control Requirements

The differences and incompatibilities which exist among various joint and multinational engineer units create barriers to achieving unified action. Some can be mitigated by providing additional resources (e.g. additional weapons, radios, or specialized training). Others must be overcome through more detailed planning, the creation of special staff functions, or providing LNOs. All of these measures tax the abilities of the controlling headquarters staff, which must be robust enough to execute them and continue "normal" operations.

This observation is not new. A comparative study of engineer support organizations in Vietnam and Bosnian operations remarked on the ability of the 1st Armored Division's Engineer Brigade to command and control a very large supporting engineer force in Bosnia.[104] This

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[103] Moffatt, "Joint Construction Engineers," 1-2, 14-16.

[104] Brinkley, "Proposed Force XXI Engineer Designs," 21-22.

engineer force consisted of seven battalions and four separate companies, well over three times the division's normal engineer complement. The engineer brigade's robust staff effectively coordinated the efforts of this large force. In contrast, the 11th Armored Cavalry Regiment in Vietnam had difficulty coordinating the employment of just one supporting engineer battalion. The regiment's small engineer staff was inadequate to meet the requirements of integrating additional supporting engineers.[105] A similar lesson had been learned during World War II, where the significant engineer support required to conduct rapid armored warfare overwhelmed the ability of a divisional engineer staff section to coordinate that support.[106] The solution adopted then was to charge an engineer group with the responsibility for controlling and coordinating all engineer support for each division. The group headquarters had the staff depth to control and support the various supporting units and detachments. In effect, the supporting group headquarters supplanted the division's engineer staff section, acting as an extension of the division staff even though not part of it. Staff depth was the key to successful unified engineer action.

The divergent experiences of the higher-level headquarters in Bosnia indicate that staff depth is also key in achieving unified engineer action during stability operations. The small engineer staff section of IFOR proved incapable of providing oversight of engineer operations, and especially of construction. In contrast, the engineer staff section at IFOR's subordinate ARRC headquarters was very robust and staffed with many professional engineers. The ARRC staff assumed responsibility for the construction design and management functions which the IFOR cell was incapable of executing, as well as all aspects of military and contractor

[105] Ibid, 13.

[106] Ibid, 28-29.

engineering support to the IFOR mission.[107] The size and capability of this staff section was key to the effective coordination of the multinational engineer effort in Bosnia.

How large is large enough? More directly, what capabilities must a headquarters possess to control a joint or multinational engineer force? The experiences of engineer units in recent operations offer insights into required capabilities. For the 1st Engineer Battalion in Iraq, control of three additional attached or supporting engineer companies and periodic attachment of Army and Marine maneuver companies severely strained the battalion's basic command and support structures.[108] The demands of up to nine units severely overtaxed the modest S1 section, designed to manage the administrative workload of four organic companies. The S4 section was similarly severely undermanned, as was the battalion's support platoon.

All sections were hard pressed, in part due to the workload associated with attached units, but also due to the diverse nature of the battalion's assigned missions. As a "legacy" battalion, the 1st Engineer Battalion was designed to plug into an existing BCT command and support structure, and brought very modest staff and logistics capabilities of its own.[109] The battalion was designed neither for extended independent operations, nor as a ground-owning maneuver battalion employing numerous supporting units to accomplish diverse missions typical of those assigned to a maneuver task force. The S3 section lacked the assets to plan, resource, and track a wide array of simultaneous combat, construction, and base support missions, and the small S2 section lacked the resources to deliver the intelligence products and analysis required to support task force operations. The battalion's shortfalls also included a medical section not authorized the battalion surgeon or physician's assistant, ambulance, or additional medics found in a maneuver battalion, and a communications section not designed to support separate task force

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[107] This paragraph is drawn from Williams, *Engineering Peace*, 86-87.

[108] This discussion is drawn from Brinkley, e-mail correspondence, February 8, 2008.

[109] Ibid.

operations. The battalion also lacked the dedicated fire support cell of a maneuver battalion, hindering the coordination of fire support for the companies conducting infantry missions.

The 1st Engineers' commander mitigated these shortfalls in a variety of ways, including reallocating personnel to reinforce small staff sections, and identifying talented officers capable of managing construction and base support operations. Beyond these internal adjustments, the BCT commander supplemented the battalion with substantial external resources, including assets from the BCT's intelligence and signal companies, a reinforced maintenance support team from the forward support battalion, a physician's assistant and medics from the medical company, and an attached Marine Air/Naval Gunfire Liaison Company (ANGLICO) fire support team.[110] These adjustments and attachments provided capabilities comparable to those in a maneuver battalion, and indicate the types of capability required in a headquarters controlling units in combat operations, regardless of whether the missions or units are engineer-specific.

The 18th Engineer Brigade also displayed significant adaptability in tailoring its command and control structure to employ attached units in Afghanistan. In this case, the principal challenges were associated with the multinational engineer contingents. These challenges centered on logistical support, technical engineer support, communications, and national sensitivities.[111] The depth of the brigade headquarters staff enabled the commander, COL Mike Flanagan, to address these challenges without significant external augmentation.

Two of the company–sized multinational contingents (the Koreans and the Poles) were commanded by colonels. Rather than attach these units to a subordinate U.S. battalion, COL Flanagan retained these units, along with a Slovak engineer unit, under brigade control. These units displayed a high degree of technical expertise in executing their assigned construction missions, but required significant support in terms of plans, specifications, construction

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[110] Ibid.

[111] This discussion is drawn from Flanagan, telephone interview, January 22, 2008.

schedules, and procurement of construction materials. The commander employed the brigade's construction management section (CMS) to fulfill these requirements and provide operational mission guidance for the multinational units. The CMS, led by a lieutenant colonel OIC, worked nearly full time to coordinate and support these units. In essence, the CMS/multinational combination functioned as a provisional battalion under the brigade.[112]

Although technically competent, the multinational units lacked the resources to support themselves logistically in independent operations. The brigade staff absorbed this additional workload without augmentation or shortfall, in addition to assisting the brigade's U.S. units with procurement of construction materials and critical repair parts. The brigade's multinational units participated in brigade command and staff meetings, either in person or via secure VTC or radio. Two Korean-American officers on the brigade staff served as LNOs, facilitating communication with the Korean contingent. No significant communications shortfalls were experienced.[113]

As with the supporting Air Force engineer units, the multinational units attached to the brigade were restricted to operating within secure FOBs. While this operational complication limited the brigade's flexibility in assigning missions, it did not require further specific changes to the brigade headquarters structure. In fact, keeping the multinational units on FOBs reduced the communications burden on the CMS section which served functionally as their parent provisional battalion. The brigade assigned all off-FOB construction and route clearance missions to its U.S. Army units.[114]

The 18th Engineer Brigade was able to adjust its structure to control a diverse mix of Army, joint, and multinational engineer units in the execution of a broad spectrum of construction and combat engineering tasks with little augmentation. This was due in large part to the large

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[112] Ibid.

[113] Ibid.

[114] Ibid.

size of its staff elements, which were able to adjust to the demands of supporting its units without significant stress. Contributing to this result was the fact that the brigade had functional responsibilities, and was not a land-owning unit. This reduced the demands on the brigade's operations staff, and allowed the brigade and its units to focus on their engineer mission. In contrast, the 1st and 5th Engineer Battalions were hard pressed to control and support their numerous engineer and other joint and multinational attachments executing diverse missions, many of which they had not trained for. Their success relied on significant adaptability and a willingness to reallocate personnel to reinforce undersized staff sections. For the 1st Engineers, in particular, success also resulted from extensive augmentation from higher headquarters. For this unit, designed with a staff and logistic structure not resourced for independent operations, additional intelligence, supply, maintenance, communications, medical, and fire support coordination assets were essential. These adaptations and augmentations were crucial in ensuring that these battalions could execute their missions as land-owning joint and multinational task forces.

The Maneuver Enhancement Brigade

At this time of high operational tempo, the Army engineer force structure is the smallest it has been in decades. In concert with overall Army transformation, the Army is implementing a modular construct for engineer forces, and began eliminating engineer battalions and engineer brigade headquarters from Army divisions in 2003.[115] The Army is thus eliminating the very headquarters which effectively controlled engineer effort during the stability operations of the 1990s. The Army is also deleting from the inventory the engineer group headquarters, relying instead on a small number of engineer brigades, designed to support corps and theater armies. These will be supplemented by the newly-devised Maneuver Enhancement Brigades (MEBs).

[115] Andrew Feickert, "U.S. Army's Modular Redesign: Issues for Congress" (Report No. RL32476, Congressional Research Service, Washington, DC, 2006), 3-5.

Development of the Concept

The MEB concept is a direct outgrowth from the overall Army modularization effort. The original concept called for a modular, scalable, and flexible brigade to provide a force commander with maneuver support, defined as the "integrated application of assured mobility and protection capabilities", and with "terrain management within an assigned area of operations."[116] Designed to support a division-sized force, the MEB would be the only support brigade designed to manage terrain, a trait it would share with the modular BCTs.[117] The MEB concept envisioned a standing organic brigade framework consisting of a headquarters company, a signal company, and a brigade support battalion. The brigade would be task organized to suit mission requirements through additional assigned or attached engineer, military police, chemical, air defense, and other units. The brigade would also receive a tactical combat force (TCF) as required to conduct area security operations. The concept called for adequate connectivity and LNOs to enable it to work for "any Army division, joint, service, multinational, or functional HQ."[118] For engineers, the MEB would fill the role formerly played by the engineer group, dating from World War II, which controlled non-divisional engineer units supporting a division or corps. The MEB expands that concept to control other support elements, and also manage terrain for a division or comparable force.

The initial MEB headquarters design called for a robust staff which provided depth in each section. The S3 Operations staff included cells for engineer, military police, civil affairs, and chemical functions, an Area Operations cell of 21 members, a Fire Support Element (FSE),

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[116] U.S. Army Maneuver Support Center, "The Army's Maneuver Enhancement Brigade," 5.

[117] Ibid, 5-8; William M. Donnelly, *Transforming an Army at War* (Washington, DC: U.S. Army Center of Military History, 2007), 50-52, 56-59. The MEB is one of five planned support brigade designs. The other four are the fires, aviation, sustainment, and battlefield surveillance brigades. None of these four is designed as a terrain manager.

[118] U.S. Army Maneuver Support Center, "The Army's Maneuver Enhancement Brigade," 11, 12.

and an Airspace Management cell. It also provided for four officers and three NCOs as LNOs.[119] Total headquarters strength under this design was 56 officers, 10 warrant officers, and 115 enlisted. The design included all elements of a BCT headquarters, except for an Information Operations (S7) section.[120]

Current Structure

Although the final design of the MEB has not been approved, the process is nearing completion.[121] The most recent headquarters design retains the basic structure of the initial concept, making slight adjustments in several staff sections.[122] The functional engineer, military police, and chemical cell personnel remain in the S3 section, but are consolidated into a Current Operations cell. The most significant size change is in the S2 section, which would grow from 12 members (3 officers, 1 warrant officer, 8 enlisted) to 21 members (4 officers, 3 warrant officers, 14 enlisted). This growth would be balanced by a loss in the large S3 section, which would shrink from 96 to 87 members. Overall headquarters strength would remain roughly the same, at 183.

The current design concept includes four LNOs (two officers and two NCOs), a decrease from the seven total in the initial concept design.[123] If the MEB is to serve as a joint or multinational headquarters, additional LNOs may prove helpful. Although the typical practice is for subordinate or supporting units to furnish LNOs to their higher or supported headquarters, multinational operations in particular are enhanced by a mutual exchange of LNOs, which helps

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[119] Ibid, 11.

[120] Ibid; Department of the Army, Field Manual 3-90.6, *The Brigade Combat Team* (Washington, DC: U.S. Government Printing Office, 2006), 2-11.

[121] Wegner, personal communication, 16 January, 2008.

[122] This discussion is drawn from U.S. Army Maneuver Support Center, "Maneuver Enhancement Brigade Way Ahead" (Captains Career Course briefing, January 23, 2008), slide 2.

[123] Ibid.

overcome language, doctrine, and cultural barriers.[124] If additional LNOs are not provided, the MEB may be forced to resource them internally.

The MEB headquarters design is multifunctional, and no one branch dominates the branch-coded staff officer positions. For example, there are eight officer positions coded for engineers, ten for military police officers, and seven for chemical officers.[125] The highest rank in each of these branch-coded series is major. While officers from these branches may also fill the seven branch-immaterial positions in the headquarters, it is clear that the branch-specific expertise on an MEB staff will be considerably less than that in a functional engineer, military police, or chemical brigade.[126] The MEB concept briefing acknowledges this lack of depth in specific functional areas, and suggests that when specific missions involve the assignment of more than two subordinate like battalions, a functional brigade may be assigned as an intermediate headquarters to coordinate their efforts.[127] When missions do not warrant such a concentration of functional expertise, the expectation is that the multifunctional brigade's strength will be its ability to integrate the efforts of disparate combat support capabilities under one brigade commander in support of the force commander.

The current core mission of the MEB states that the brigade is "a mission tailored force that conducts support area operations, maneuver support operations, and support to consequence management in order to assure the mobility, protection, and freedom of action of the supported force."[128] The number and type of assigned or attached subordinate units will depend on the

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[124] Chairman of the Joint Chiefs of Staff, Joint Publication 3-0, *Joint Operations*, II-6, III-9.

[125] U.S. Army Maneuver Support Center, "Maneuver Enhancement Brigade Way Ahead," (Captains Career Course briefing, January 23, 2008), slides 7-9.

[126] For example, a corps- or theater army-level engineer brigade headquarters is authorized 32 to 35 officers, including one colonel and four lieutenant colonels; virtually all are engineer positions. FM 3-34, *Engineer Operations*, D-5, D-16.

[127] U.S. Army Maneuver Support Center, "The Army's Maneuver Enhancement Brigade," 12.

[128] Ibid, 9.

nature of the brigade's assigned mission, which will depend in turn on the supported force's mission. Missions involving river crossings or route clearance would likely require a significant engineer component in the brigade's forces, supplemented by military police and perhaps air and missile defense assets. The engineers/military police mix would also be key to successfully establishing, maintaining, and securing ground lines of communication (LOCs). An area damage control and consequence management mission would likely require the addition of chemical, explosive ordnance disposal (EOD), medical, and civil affairs units to this force mix.[129] For other likely MEB missions, military police or chemical units could predominate. The flexible MEB structure offers a means to integrate the efforts of these forces under one brigade commander.

A further advantage of the MEB is its ability to deploy more rapidly and begin operations more quickly than several functional brigades.[130] The rapid deployability and response of the MEB will be due in large part to its organic signal company and brigade support battalion, which provide a standing communications and logistic infrastructure to simplify the integration of attachments. It will complement the Army's modular, BCT-centric expeditionary force. A mission-tailored MEB can conduct initial operations and execute assessments, if necessary handing over more complex tasks to one or more later-deploying functional brigades.

The MEB as a Joint/Multinational Task Force

The MEB is a new concept, and it has not yet been officially recognized in doctrinal publications as a potential joint or multinational task force headquarters. Currently, the only engineer organizations so recognized are the headquarters of the naval construction regiment (NCR) and the Army's ENCOM and engineer brigade headquarters, each requiring appropriate

[129] This discussion is drawn from Shumway, "Strategic Analysis of the MEB", 9-11.

[130] Ibid, 10; U.S. Army Maneuver Support Center, "The Army's Maneuver Enhancement Brigade," 8.

augmentation.[131] Shumway suggests that the MEB "might serve as a Joint Security Coordinator to oversee security, communications, intelligence, terrain management, limited sustainment, infrastructure development, and host-nation support for a small Joint Security Area."[132] In addition to supporting other services, he suggests that the MEB "could support multinational forces, if augmented by more robust sustainment assets and a liaison team with linguists and foreign area expertise."[133] Recent experiences of Army engineers controlling joint and multinational forces suggests that the MEB headquarters structure may be sufficient to serve in this role, within limits.

In each of the cases examined here, accommodating joint or multinational forces required a robust staff and support structure capable of meeting the needs of the attached forces. For the 1st and 5th Engineer Battalions in OIF, managing multiple attached engineer and other forces, some of them joint or multinational, required significant external resources to buttress overtaxed staff and support elements, and significant reorganization of command and staff elements. Both commanders agree that their basic battalion structures would have been inadequate to accomplish their tasks. They also agree that the baseline capability requirements for a headquarters controlling such attachments are those found in a BCT headquarters.[134]

With the exception of an Information Operations (S7) section, the proposed MEB headquarters has capabilities like those of a BCT headquarters. Although the fire support element (FSE) is not large (two officers, one warrant officer, four enlisted), its presence provides the MEB with significantly more fire support coordination capability than any engineer battalion or

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[131] NTRP 4004.2.1, *Naval Construction Force,* 3-2; JP 3-34, *Joint Engineer Operations,* B-A-2, 3; FM 3-34, *Engineer Operations,* D-4.

[132] Shumway, "Strategic Analysis of the MEB", 15.

[133] Ibid.

[134] Brinkley, e-mail correspondence, February 14, 2008; Funkhouser, e-mail correspondence, February 17, 2008.

functional engineer brigade has.[135] The small LNO cell of the revised MEB headquarters design still has four more dedicated LNOs than does the standing Engineer Brigade or NCR. The MEB's organic signal company and brigade support battalion represent an immediate capability to provide common-user communications and logistic support to attached forces. These elements can assist the brigade staff in resourcing the specialized communications and logistic support which a joint or multinational unit may require.

From the standpoint of coordinating and supporting engineer action, the MEB lacks depth in engineer-coded staff positions. The MEB design has just eight such positions, none ranking higher than major. With these located in the Current Operations cell of the S3 Operations section, the MEB as currently designed would be unable to provide construction design, specification, scheduling, and materials procurement support comparable to that provided by the 18th Engineer Brigade to its attached units in OEF.[136] In a full spectrum operational environment, the Current Operations cell will find it difficult to spare eight officers to fill this construction management role.

The 18th Engineer Brigade was able to devote the efforts of its nine CMS officers and 22 enlisted members nearly full time to keeping its three multinational construction engineer units supplied with plans, schedules, and materials. These units were technically capable but under-resourced in terms of design and construction management expertise and logistic self-sufficiency.[137] The diversion of the brigade's CMS section to fill these gaps was crucial to capitalizing on the abilities of these units and ensuring the unified engineer action of the combined force.

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[135] U.S. Army Maneuver Support Center, "Maneuver Enhancement Brigade Way Ahead," 2.

[136] Flanagan, telephone interview, January 22, 2008.

[137] Ibid.

It is doubtful that the sparse engineer staff of an MEB would have been as successful in this situation without significant augmentation. In order to fill this gap, an MEB could be augmented with the CMS from a functional brigade. Alternatively, the MEB could have placed its multinational units under a subordinate U.S. engineer battalion, which could employ its modest technical and construction inspection cells to oversee and assist the multinationals. Such an approach would have been far less desirable than that adopted by the 18th Engineer Brigade. Treating the brigade's multinational units collectively as a provisional battalion reporting directly to the brigade ensured that the brigade could rapidly address these units' needs. It also placed their commanders, two of whom were colonels, more nearly on par with the brigade commander, respecting sensitivities of national pride.

Conclusion

U.S. Army engineers have a long history of joint and multinational operations, beginning during World War II. Those operations demonstrated that unified action, achieved through centralized command or coordination of engineer forces of all types, was essential to providing effective support to combat commanders, especially when resources were scarce. Key attributes of successful joint and combined engineer forces were clear command and support relationships, unit capabilities appropriate to missions, and robust staffs capable of managing diverse unit capabilities and needs.

After a long hiatus during the Cold War, the value of joint and multinational engineer cooperation is again being proven during current operations. U.S. military engineer forces are now much smaller, and U.S. doctrinal commitment to joint and multinational operations is greater, than at any time since the end of World War II. Current "Long War" experience has validated the continuing relevance of joint and multinational operations. It has also ratified the continuing value of the World War II attributes of successful joint and multinational engineer

organizations: clear command and support relationships, appropriate unit capabilities, and robust staffs.

Current Army engineer experience includes combat engineer battalions serving as ground-owning maneuver task forces controlling the efforts of attached joint and multinational units, both engineer and non-engineer, executing a wide range of missions. These units have required significant staff and support augmentation to enable them to succeed in a role for which they were not designed. Engineer brigade headquarters more narrowly focused on engineer missions, and without the responsibility of coordinating combined arms operations as a ground-owning unit, have been able to control joint and multinational engineer units through the efforts of their more robust staff organization without substantial augmentation.

Ongoing Army transformation efforts are eliminating many of the headquarters structures which formerly provided effective command and control of joint and multinational engineer operations. The multifunctional MEB offers the promise of integrating the efforts of multiple combat support units under one brigade commander in order to better meet the needs of the supported force commander. The MEB's fairly robust multifunctional staff structure includes the elements required for success in owning ground and conducting combined arms operations. Further, its organic support battalion and signal company provide critical sustainment and communications capabilities which will assist in integrating and supporting attached units. However, its standing expertise in engineering and other specific branch functions is limited, and its span of control may be exceeded if it is assigned many diverse units with special abilities and needs. Attached joint and multinational engineer units impose just such demands on a headquarters.

The MEB may be an appropriate structure to control limited numbers of joint and multinational engineer units in contemporary operating environments, subject to the following caveats and recommendations:

Engineer units are not alike. Commanders must be aware of differences in technical capability, equipment, and logistics capacity to determine how best to employ their joint or multinational units, and what augmentation the headquarters may require.

Commanders must be sensitive to the unique leadership and national pride issues which multinational units may bring to their organizations. Issues of rank may dictate where units are placed in the command.

Liaison officers are key enablers of effective joint and multinational operations. The small LNO section in the current MEB headquarters design may be adequate for "typical" operations, but for the MEB to integrate joint or multinational units, it will require LNO augmentation. Army force planners should develop a modular LNO section structure which can plug into existing headquarters. The modular section should make provision for technical skills, language ability, and cultural awareness.

Joint and multinational construction engineer units vary in their capability to design and manage construction projects. If a force headquarters receives units lacking such capability, the headquarters must furnish the capability. The MEB headquarters does not have an organic design or CMS section. The Army Engineer School should develop a modular CMS which can plug into the existing MEB design. It should also be able to augment engineer battalion or brigade headquarters.

The modest engineer staff of the MEB will be hard pressed to control and support multiple subordinate engineer units, particularly if these units arrive with sustainment capability shortfalls. The staff of a functional engineer brigade is far better suited to provide direction and support of multiple diverse engineer units in a contemporary operating environment. Force planners should consider assigning a functional engineer brigade headquarters to augment the MEB whenever more than two engineer battalions are assigned.

Additional research is needed in the following areas:

The services' engineer units vary substantially in their capabilities. Multinational units display an even larger range of capabilities and requirements. A systematic survey of the unique specific capabilities that various nations' military engineer forces can bring to a coalition force would greatly aid force planners.

The concept of a joint construction engineer force offers substantial advantages in terms of commonality of organization, doctrine, training, and equipment. The services have already accomplished some tentative initial steps toward realizing such a concept, which could greatly simplify a force commander's effort to achieve unified engineer action. Further development of how a fully joint construction engineer force could be implemented would provide the services with a road map for action.

Army engineers have engaged in joint and multinational operations over many years. Under current joint force doctrine, their involvement in such operations will likely increase in the future. As the engineer force restructures to meet the needs of a transforming Army, it must retain the ability to command and control joint and multinational engineer forces to achieve unified engineer action in support of force commanders.

The MEB is not a substitute for a functional engineer brigade headquarters. It is designed to fill a specific niche in a modular Army construct: the integration of diverse combat support functions and terrain management for a force commander. Its multifunctional staff and organic communications and support elements enhance its ability to accept, direct, and support limited numbers of joint or multinational units. Its modest engineer staff limits its ability to direct more than a small overall engineer force. The engineer brigade headquarters retains its relevance as a powerful tool to control a joint or multinational force to achieve unified engineer effort.

> MG Hardcastle fumed. Eight weeks into the deployment, the maneuver enhancement brigade had its hands full managing its multitude of missions. In addition to route and area clearance, the brigade's engineer staff was hard pressed to manage a significant bridge repair and replacement operation. Several coalition construction engineer units had just arrived, and were placing great

stress on the staff. Although very accomplished builders, these units did not bring any project planning expertise with them. Construction materials which should have been forecasted had still not been ordered, and the brigade commander was forced to revise again the completion date for the base camp housing.

"Jim, the whole idea was to get our troops out of canvas by September. Now you're telling me that we'll be only half done before the heavy snow season?"

"Yes, Sir, I'm afraid so. What's worse, the snow will pretty much shut down the construction effort, so we won't make any significant progress again until May."

"By that time, we'll be looking at the back end of this mission. I'll have a tough time explaining why we built housing three months before leaving it. How did we get into this mess?"

"Sir, my MEB is a great organization, but it's not really structured to handle all of these engineer requirements. Frankly, the joint and coalition piece has been a much bigger load than we anticipated. The rest of the staff has tried to help, but they've got their own headaches with displaced persons, detainee operations, and the hazardous materials situation."

"My boss is sending help. He's cutting loose one of the few available engineer brigades to help us manage these missions. They should be on the ground early next month. Unfortunately, they'll just begin to make a difference about the time the snow flies."

"Sir, it sure would have been nice to have them up front."

Hardcastle tried not to let his frustration show. "I had doubts about this arrangement all along," he thought. "I wish I had voiced those concerns from the start …"

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